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PROBLEMS AND PROGRESS IN THE PROCESSING OF FRUITS AND VEGETABLES IN THE REGION

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INTRODUCTION

The Caribbean area has been one, where the development of food processing technology has been neglected for the last three hundred years (Lucas, 1980). Sammy (1974) succinctly points this out as follows: "Historical perspective will help us to understand the reasons for so heavy a dependence on foreign sources for most of our food requirements and our lack of processing technology. As colonies, we were producers of raw materials and consumers of processed goods. Thus past political and economic conditions did not encourage the development of processing and manufacturing skills."

It may be useful at this point to define what is meant by processing. Processing refers to the following:

- (a) Primary Processing
- (b) Secondary Processing
- (c) Tertiary Processing

Primary Processing results in no physical change in the appearance of the commodity. This process includes washing, grading and packaging of the commodity in suitable flexible films. This process is normally seen in vegetable and fruit chill-counters in supermarkets.

Secondary Processing results in little change in the physical appearance of the commodity, although actual preservation techniques have been used on the commodity. Secondary Processing includes freezing and fermentative preservation of fruits and vegetables.

Tertiary Processing results in an end-product which is completely different in physical and bio-chemical characteristics from the original raw materials. For example, jams, jellies and dehydrated onion powder.

This paper examines the problems and progress in the fruit and vegetable processing industries in the Caribbean. Particular reference is made to the developments in the eastern Caribbean, with which the writer is quite familiar. In addition, for ease of management, primary, secondary and tertiary processing problems and progress are dealt with compositely.

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PROCESSING PROBLEMS IN THE REGION

(i) Eating Habits:

The eating habits of the region have resulted in major problems for the local food industry. The eating habits of a people are determined by cultural factors. Cultural, in this context, refers to the complex of knowledge, faith, art, morality, laws, customs and all other elements including technical evolution and habits adopted by the human being as a member of a particular society. In other words, people tend to prefer foods in the forms to which they are accustomed.

The case of "Instant Yam" which was produced in Barbados is a good example of the negative impact of eating habits on food processing developments in the area. One of the main reasons for the failure of the product, was the fact that in the developmental stages, no one reflected on what the consumer preference (eating habits) would be. It would appear to be a truism to state that no self-respecting Barbadian would prefer dehydrated yam flakes, if the fresh commodity were available.

Indeed, at the Barbados Marketing Corporation, there were large stocks over a two-year period. According to Edgehill (1982), even in periods of yam shortages, "Instant Yam" was mainly purchased by restaurants and to the tourist sector. In addition, from a technical point-of-view, the "Instant Yam" did not possess the "crunchy mouth-feel" which is associated with mashed yam prepared from the fresh product, with which the consumer is familiar.

The technology for the manufacture of yam and plantain chips has been developed in Puerto Rico (Martin and Ruberte, 1972; Rodríguez-Sosa et al, 1969). Despite the excellent nature of these products, little in-road has been made on the consumption of Irish Potato chips. Consumers in the area have been culturally conditioned to feel that the only product chips can be made from is Irish Potato. There is, therefore, need to re-educate the consumer in an effort to circumvent the negative aspect of local eating habits. This can be done by adequate promotion of local food products.

(ii) Processing of Foreign Raw Material:

The Caribbean area is noted for frequent shortages of agricultural products and high food import bills. Total food imports for the region rose from \$38 million before World War II, to \$245 million in 1964 (Edwards and Cropper, 1967). This figure increased to \$507 million in 1972. The food import bill today, is in excess of one billion (Trinidad and Tobago) dollars. This fact has resulted in the establishment of fruit and vegetable processing industries. It was hoped that when the processing units became viable, they would have accumulated the production of locally produced raw material (Sammy, 1974). The fruit and vegetable

processing industries (with the exception of citrus to some extent) have failed to stimulate increased output from the agricultural sector; they have actually become the causative agent for reduced production, by being mere packaging plants for excess raw materials produced in the developed countries (Lucas, 1980). Table 1 gives data for the processing industries in Trinidad. It can be seen from the data presented in Table 1, that apart from citrus (which is imported from Belize) inputs for the fruit and vegetable industries are either imported in the semi or fully processed forms. According to Jeremiah (1978), 99% of the tomato ketchup prepared in Trinidad and Tobago is made from imported paste (Table 1.2).

For food processing industries in the area to develop, there is need for an adequate and reliable source of locally produced raw material at reasonable cost. Except for the export crops, there is little or no organized production of food crops. The development of processing industries, will therefore depend on the scale and rate of development of each food crop to be processed, which will in turn depend on existing and potential markets. Since production of raw materials and processing must be established almost simultaneously, then the market potential will determine the scale of processing plants. This initially, small scale plants with room for expansion would seem a logical choice (Sammy, 1974). So far, the attempts made by regional Governments and local entrepreneurs have ignored this. It would seem that no feasibility studies were conducted to determine capacity of plants with respect to local raw material supplies. Therefore, to reduce operational costs, it is much easier to import cheap raw materials, than to use local materials (Lucas, 1980).

(iii) Lack of Proper Processing Technology

Most of the processing locally is done by persons with no formal training in food processing technology. Therefore, the processing of fruits and vegetables started on a cottage industry basis in the home. By a process of trial-and-error adequate end-products were obtained. Having obtained a workable formula, the local processor sticks to it. This, however, results in the lack of standardization of end-products from batch-to-batch and within batches. This is particularly so when the processor has to purchase fruits from different orchards. Fruits vary in sugar, acid and pectin contents. These variations affect the breaking strength of jellies and can result in end-products which are either too hard or free-flowing. These characteristics are quite readily seen in jams and jellies made locally. Therefore, there is a need to blend fruits and to know the levels of solids, acid, and pectin present. This, therefore, means that the processor has to be able to adapt his processing techniques to suit any variations in fruits being processed.

The education system can be blamed in part for the lack of proper food processing technology in the region. Efforts have been concentrated on the pure sciences and not the applied sciences. This is slowly changing as it has been realized that there is a need to have "doers" if the society is to progress.

Table 1.--Imports of major processed food products, Trinidad and Tobago, 1978^x

Products	Total ^{xx}	Extra Regional ^{xx}	Intra Regional
Tomato juice	54.2	54.2	
Tomato paste	48.7	48.7	
Vegetable products ^{xxx}	140.4	138.4	2.0
<u>Fruit Juices</u>			
Lime juice (conc)	6.4	6.4	
Lime juice (clear)	0.6	0.6	
Other fruit juices	990.7	990.7	
Grapefruit (conc)	39.6		39.6
Grapefruit (nonconc)	109.2		109.2
Orange juice	1402.5		1402.5
Orange juice (nonconc)	36.4		36.4
<u>Dried Fruits and Peels</u>			
Pineapple preserved	79.5	79.5	
Fruits preserved	1.2	1.2	
Citrus preserved	7.6	7.6	
Other in sugar	83.5	83.5	
<u>Other Fruit Products</u>			
Mangoes (canned)	2.0	2.0	
Oranges (canned)	4.8	4.8	
Citrus pulp	0.5	0.5	
Total	3008.3	1418.16	1589.7

^xPress et al. 1980.

^{xx}Expressed as tonnes.

^{xxx}Includes frozen peas which are locally canned.

Table 1.2.--Imports and exports of tomato paste in Trinidad and Tobago, January 1975 - August 1977*

Period	Tomato Paste			
	Imports		Exports	
	lbs.	\$TT	lbs.	\$TT
Jan - Dec 1975	105,721	112,105	438	578
Jan - Dec 1976	256,691	115,612	27,901	47,823
Jan - Aug 1977	891,843	714,382	19,034	31,122

*Source: Overseas Trade report, Central Statistical Office, Port-of-Spain, Trinidad.

(iv) Lack of Adequate Juice Extraction Equipment:

Most of the equipment available for extracting juice from fruits, has been manufactured by the developed countries. The equipment needs to be modified before extraction of juice from the West Indian Cherry, mango and soursop can occur. Sánchez-Nieva (1955) describes a method for the extraction of cherry juice. It is quite obvious that there is need for research work in this area.

(v) Lack of Knowledge of the Biochemical Characteristics of Local Fruits:

There is dire need for work to be done in this area. Obviously even if a proper knowledge of processing technology were available, lack of the knowledge of the basic biochemical nature of the product being dealt with, would still result in a poor standard of end-product. Therefore, there is the need for investigative work to be done on the biochemistry of the breadfruit for example.

(vi) The Establishment of Flour Mills:

The use of composite flour seems to have ended with the establishment of flour mills in the region. The addition of sweet potato and cassava flours to wheat flour, would have had tremendous impact on the processing of these two root crops.

PROGRESS IN THE PROCESSING OF VEGETABLES AND FRUITS

There has been some progress, but this has been a rather slow affair: One area of progress, has been the establishment of Agro-laboratories in a number of countries in the region. There are research and development laboratories dealing with food in St. Vincent, St. Lucia, Guyana, Trinidad, Barbados, Jamaica, to name only a few of the islands. There is, therefore, a small pool of trained personnel in the area. This pool is expected to increase, as the food technology division of the University of the West Indies expands.

Efforts have been made to produce candied fruit peel at the University of the West Indies and a substitute for prunes at the Caribbean Industrial Research Institute in Trinidad. These efforts have been successful, and it remains for the private sector or Government to make these products commercial successes. The University of the West Indies Food Technology's division, headed by Prof. G.M. Sammy has successfully developed sorrel concentrate. The Industrial Development Corporation in Trinidad has commercialized the product. In addition, the conditions for concentrating West Indian lime juice have been demonstrated by Lucas (1980).

Locally, there has been the production of local wines from parsley, breadfruit, carrot and other local fruits and vegetables. It is a cottage industry, but the quality of the wines appear to be good.

SUMMARY

The problems in the processing area are numerous. Processing plants function primarily as packaging plants for imported raw materials. The eating habits of the Caribbean peoples have had an adverse effect on the development of locally processed products. There is a lack of proper processing technology; however, with the proliferation of Agro-laboratories, some progress has been made in this direction. Some progress had been made in the area of fruit juice concentrates and in the candying of citrus peel. However, the processing of fruits and vegetables in the area, is still in the embryonic stages and much more research is needed into the biochemical characteristics of local produce.

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